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August 7, 2003

U S Nuclear Regulatory Commission
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KEWAUNEE NUCLEAR POWER PLANT
DOCKET 50-305
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**NUCLEAR REGULATORY COMMISSION BULLETIN 2003-01: POTENTIAL IMPACT
OF DEBRIS BLOCKAGE ON EMERGENCY SUMP RECIRCULATION AT
PRESSURIZED-WATER REACTORS - 60 DAY RESPONSE**

On June 9, 2003, the Nuclear Regulatory Commission (NRC) transmitted Bulletin (BL) 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors." The NRC required that specific information be provided within 60 days of the date of the bulletin. In accordance with this requirement, Nuclear Management Company, LLC (NMC) is providing the 60-day response for the Kewaunee Nuclear Power Plant.

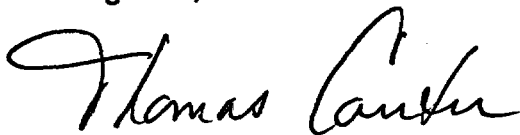
This letter contains six new commitments and no revisions to existing commitments.

1. NMC will present to the operating staff a just-in-time training briefing on sump clogging by September 30, 2003, and will develop and implement training on sump clogging by December 19, 2003.
2. NMC will review and revise, as appropriate, the Integrated Plant Emergency Operating Procedure (IPEOP) for containment sump recirculation to incorporate interim compensatory measures to throttle the residual heat removal (RHR) pump discharge valves in the event cavitation occurs in the pumps. Additional evaluations will also be requested of the technical support center with regards to addressing sump blockage concerns. These changes will be implemented by September 30, 2003.

3. NMC will submit an implementation schedule for revising integrated plant emergency operating procedures, where appropriate, to stop or throttle redundant pumps that are not necessary to provide required flows to cool containment and the reactor core. NMC will submit this implementation schedule within 30 days of the issuance of the generic guidance by the Westinghouse Owners Group, currently expected by March 31, 2004.
4. NMC will develop a plan to continue the removal of labels in containment that have the potential to be a debris source and provide long-term procedural guidance for labeling in containment prior to the 2004 outage.
5. NMC will determine potential enhancements to improve containment inspection procedures for foreign material control; procedure revisions will be issued for implementation during the 2004 refueling outage.
6. NMC will perform an evaluation to analyze the emergency core cooling system and containment spray system recirculation functions with respect to the potentially adverse post-accident debris blockage effects on the containment sump, taking into account the recent research findings, to verify compliance with existing applicable regulatory requirements. NMC will continue to work with the Nuclear Energy Institute (NEI) to follow Generic Safety Issue 191 resolution methodology, currently being developed by NEI. NMC will implement the methodology, as appropriate for Kewaunee Nuclear Power Plant.

The interim compensatory measures as described in the above commitments 1 – 5, will remain in place until commitment 6 is complete.

I declare under penalty of perjury that the foregoing is true and accurate. Executed on August 7, 2003.



T. Coutu
Site Vice President, Kewaunee Nuclear Power Plant

CC Regional Administrator, USNRC, Region III
Project Manager, Kewaunee Nuclear Power Plant, USNRC, NRR
NRC Resident Inspector – Kewaunee Nuclear Power Plant

Attachment:

ATTACHMENT

NUCLEAR MANAGEMENT COMPANY, LLC

**KEWAUNEE NUCLEAR POWER PLANT
DOCKET 50-305**

August 7, 2003

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
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KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

8 Pages to Follow

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
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DRAFT – Rev. August 7, 2003

Requested Information

All addresses are requested to provide a response within 60 days of the date of this bulletin that contains the information requested in Option 1 or Option 2.

Option 1: State that the ECCS and CSS recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in this bulletin, taking into account the recent research findings described in the Discussion section, and are in compliance with all existing applicable regulatory requirements.

Option 2: Describe any interim compensatory measures that have been implemented to reduce the risk which may be associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. If any of the interim compensatory in the Discussion section will not be implemented, provide justification. Additionally, for any planned interim measures that will not be in place prior to your response to this bulletin, submit an implementation schedule and provide the basis for concluding that their implementation is not practical until a later date.

Response

Nuclear Management Company, LLC (NMC) is providing a response in accordance with Option 2 of Nuclear Regulatory Commission (NRC) Bulletin (BL) 2003-01, "Potential Impact Of Debris Blockage On Emergency Sump Recirculation At Pressurized-Water Reactors," for the Kewaunee Nuclear Power Plant (KNPP). NMC selected Option 2 for KNPP, as the detailed analyses necessary to address Option 1 have not been performed at this time.

Interim compensatory measures that have been or will be implemented to reduce risk which may be associated with potentially degraded or nonconforming emergency core cooling system (ECCS) and internal containment spray (ICS) system recirculation functions until an evaluation to determine compliance is complete are listed below.

- ***Operator training on indications of responses to sump clogging***

Interim compensatory measures that will be implemented

NMC is developing Just-In-Time Training for the KNPP Operators. Topics included in this training are:

- An overview of NRC Bulletin 2003-01 concerns.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

- An overview of compensatory measures in place.
- An overview of Integrated Plant Emergency Operating Procedures (IPEOPs) that address containment sump issues.
- An overview of actions to be performed to address the concerns associated with this bulletin.
- An overview of indications available to the operator in the control room that would be indicative of sump clogging.
- Reinforcement of management expectations that licensed operators monitor plant equipment for degradation.

NMC has reviewed existing operator training programs and determined a need to enhance operator training relative to indications of and responses to sump clogging. A sump clogging training module will be developed and administered to licensed operators, auxiliary operators, and Emergency Directors. The sump clogging training will include, but not be limited to, the following topics:

1. Review of the response to loss of coolant accidents (LOCAs), using the integrated plant emergency operating procedures (IPEOPs).
2. Review of the importance of aggressively cooling the reactor coolant system (RCS) in order to transition to shutdown cooling as soon as possible to avoid recirculation cooling.
3. Review of indications of ECCS and ICS pump distress including erratic discharge header pressure and header flow indication and the impact reduced flow will have on reactor coolant parameters.
4. Review of the impact of sump clogging on the IPEOP critical safety functions due to diminished ECCS/ICS performance.
5. Review of the content and implementation of the severe accident management guidelines (SAMGs), including actions available within the SAMGs to respond to sump clogging.
6. Review of proposed changes or enhancements to operating procedures.
7. Simulator exercises demonstrating a loss of recirculation flow due to clogged sump screens and reinforcement of classroom training.

Implementation Schedule: The Just-In-Time Training (JITT) Briefing will be presented to the operating staff by September 30, 2003. The sump clogging training will be developed and implemented by December 19, 2003. The basis for delaying implementation beyond the 60-day response date is to allow sufficient time to complete proposed procedure revisions, develop training materials and train affected personnel.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

- ***Procedural modifications, if appropriate, that would delay the switchover to containment sump recirculation (e.g., shutting down redundant pumps that are not necessary to provide required flows to cool the containment and reactor core, and operating the CSS Intermittently)***

Interim compensatory measures that have been implemented

Currently the integrated plant emergency operating procedures (IPEOPs) contain steps that are intended to delay the RWST inventory depletion. Specifically, the IPEOP for the Loss of Emergency Coolant Recirculation addresses minimizing outflow from the RWST by reducing SI flow rate and stopping the containment spray pumps, if conditions allow.

Interim compensatory measures that will be implemented

NMC has initiated a procedure change request to revise the IPEOP for transferring to containment sump recirculation. Plans are that the following guidance will be added to the IPEOP:

1. Check for signs of RHR pump cavitation after containment recirculation is obtained. If cavitation is occurring, the RHR pump discharge throttle valves will be throttled to the same value stated in the procedure in the event that indication of pump runout is experienced in the pumps.
2. Request the technical support center evaluate alternate core injection paths, alternate methods of filling the RWST, and long-term sump blockage concerns. This change request is termed interim because the RHR pump discharge throttle valves are not safety related components.

Implementation Schedule: The Interim Compensatory Measure to review and revise as appropriate the IPEOP for transfer to containment sump recirculation will be completed by September 30, 2003. This delay allows for time review and approval of the procedure change.

Preliminary assessment by NMC, in consultation with the Westinghouse Owners Group (WOG), indicates that securing high pressure safety injection (HPSI) and low pressure safety injection (LPSI) pumps prior to recirculation, may have an adverse effect on plant safety by substituting manual actions for existing automatic actions and introducing a potential for a single active failure vulnerability. At the present time, it appears that the overall safety benefit is to maintain as much core cooling as possible.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

The WOG has scheduled to change and issue revisions to the emergency response guidelines (ERGs) to provide generic guidance for containment sump blockage issues. Implementing changes to procedures to take pre-emptive operator actions to shut off LPSI and HPSI will be considered after WOG programs have been completed to evaluate the generic impact of these changes. Pre-emptive operator actions to stop pumps or throttle flow solely for the purpose of delaying switchover to containment sump recirculation will not be implemented until the impact of the changes can be evaluated on a generic basis for the following reasons:

1. Operator actions to stop LPSI or HPSI pumps or throttle flow may result in conditions that are either outside of the design basis safety analyses assumptions or violate the design basis safety analyses assumptions (single failure). This would result in the potential for creating conditions that would make the optimal recovery more challenging.
2. These actions are inconsistent with the overall WOG ERG philosophy. The WOG ERGs are symptom-based procedures that provide for the monitoring of plant parameters and prescribe actions based on the response of those parameters. To avoid the risk of taking an incorrect action for an actual event, the WOG ERGs do not prescribe contingency actions until symptoms that warrant those contingency actions are identified.
3. These actions are inconsistent with the current operator response using the WOG ERGs that has been established through extensive operator training. The expected operator response is based on the optimal set of actions considering both design basis accidents and accidents outside the design basis. The WOG ERG operator response is not limited to a specific accident progression in order to provide optimal guidance for a wide range of possible accidents.
4. To be effective in delaying the switchover to containment sump recirculation, operator actions to stop HPSI or LPSI pumps must be taken in the first few minutes of an accident. This introduces a significant opportunity for operator errors based on other actions that may be required during this timeframe. Any new operator actions to stop HPSI or LPSI pumps, when modeled in the probabilistic risk assessment (PRA), are likely to result in increased risk due to operator error.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

For these reasons, this proposed change might require a revision to the safety analysis and license amendment. Due to the complexity of justification for this proposed change, the WOG has scheduled to change and issue revisions to the ERGs to provide generic guidance for containment sump blockage issues by March 31, 2004. Within 30 days after the issuance of generic guidance by the WOG, NMC will evaluate the changes recommended and submit an implementation schedule for the applicable EOP revisions. The basis for delaying implementation beyond the 60-day response date is to allow sufficient time to resolve any potential inconsistencies with existing safety analysis assumptions and obtain prior NRC approval, as appropriate.

- ***Ensuring that alternative water sources are available to refill the RWST or to otherwise provide inventory to inject into the reactor core and spray into the containment atmosphere***

Interim compensatory measures that have been implemented

Procedural guidance is provided to the operator in the IPEOP for a Loss of Emergency Coolant Recirculation, to refill the RWST. Specifically, normal operating procedures are referenced for boron concentration control. Numerous options are available to the operator depending on power availability, tank contents, valve accessibility, and rate required. The issue of containment flooding is addressed upon indication of a specified level in containment. The IPEOP titled, "Response to Containment Flooding," is entered to address flooding issues.

NMC currently does not plan to add any additional injection path options that are not already included in the IPEOP for a loss of emergency recirculation. Injection paths from either containment sump recirculation or the RWST are the primary options. Reactor coolant system (RCS) depressurization with accumulator injection is incorporated into this procedure. Makeup to the RWST was previously discussed.

- ***More aggressive containment cleaning and increased foreign material controls***

Interim compensatory measures that have been implemented

NMC has reviewed existing procedure requirements for containment cleaning and foreign material controls. This review indicated that procedure requirements currently exist to reduce the possibility of containment sump blockage due to debris and foreign material. These requirements are implemented procedurally, through a work area cleanliness procedure and performing a containment inspection using a checklist prior to commencing power operations. The checklist ensures each major elevation and compartment in containment is inspected and any debris or loose materials that have the potential to reach the recirculation sump screens are removed.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

The procedural guidance describes areas of specific concern such as ensuring filter bags have been removed from floor. Additionally, procedural guidance is given for equipment stored in containment to ensure it is restrained to preclude transportation to the sump. Potential enhancements to this procedure, and the similar procedure used during power operations, will be evaluated and revisions will be made as deemed appropriate.

In addition, foreign material inside of containment is minimized by the use of service level I coatings. Service level I coatings are appropriate for the environmental conditions potentially encountered in containment. Plant procedures and an engineering specification dictate the personnel qualifications and requirements for applying and inspecting service level I coatings.

Interim compensatory measures that will be implemented

In 1997, an extensive label removal/replacement effort was conducted that concentrated on items in the submergence zone of the containment basement. NMC has initiated actions to devise a plan to continue the removal of labels in containment that have the potential to be a debris source and provide long-term procedural guidance for labeling in containment.

A review of containment closeout procedures indicated that potential enhancements might be necessary to provide for more aggressive containment foreign material controls. These potential enhancements will be evaluated and additional measures will be implemented to improve the containment inspection procedures.

Implementation Schedule: NMC will develop a plan to continue the removal of labels in containment that have the potential to be a debris source and provide long-term procedural guidance for labeling in containment prior to the 2004 outage. The enhanced containment inspection procedures will be implemented during the 2004 refueling outage. The basis for delaying implementation beyond the 60-day response date is to allow for proper planning and appropriate plant conditions to perform these activities consistent with as low as reasonably achievable (ALARA) requirements.

- ***Ensuring containment drainage paths are unblocked***

Interim compensatory measures that will be implemented

The configuration of Kewaunee's containment is conducive to directing flow to the containment sump. The entire floor of the 592' elevation of the containment building, and the sump below the ECCS strainers, serves as the emergency core cooling system (ECCS) sump for collection of water introduced to the containment following a LOCA.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

The 592' floor elevation is essentially an open area except for the primary reactor shield wall, and support columns and walls for the loop compartments.

A transport study was performed in 1997. It documents the location and height of penetration sleeves, toe rails and stairwells on the major floor elevations above the containment basement.

Note: Containment spray or piping leakage entering the steam generator, reactor coolant pump or pressurizer compartments will exit to the containment basement through grated flooring or open shelf flooring in the vaults.

The transport study provides flow velocities for the various transport paths on each elevation. The transport study and related engineering evaluations, resulted in the installation of additional floor penetration sleeves (collars), a refueling cavity standpipe, and a gate with a four-inch toe rail to minimize the transport of debris to the recirculation sump screens. Unobstructed flow paths remain, however, on each containment floor elevation, with two holdup areas discussed below.

A gate with a four-inch toe rail was installed on the north stairwell, on the 606' elevation, which is the stairwell nearest the recirculation sump screens. The installation of this gate does not result in a flow holdup area. The gate was installed in 1997 to prevent the transport of failed, unqualified coatings in this area. The south stairwell on this same elevation is unobstructed; therefore, water will not collect on this elevation.

Holdup area: The refueling cavity standpipe, also installed in 1997, prevents the transport of heavier than water debris from entering the cavity floor drain and transporting to Containment Sump A. The floor drains in containment empty into Containment Sump A. Sump A, which normally discharges to the sludge interceptor tank, is isolated from the Auxiliary Building post-accident, and this sump eventually overflows to the containment basement floor. The standpipe in the refueling cavity floor drain is approximately six inches high. Following the onset of containment spray, spray water will collect in the refueling pool cavity up to the height of the standpipe. This small flow diversion was evaluated and determined to have an insignificant effect on: the submergence level in containment, the NPSH available for the RHR pumps during containment sump recirculation, the sodium hydroxide and boric acid concentrations in the containment sump and the post-accident structural loading for the refueling cavity sump.

**NRC BULLETIN 2003-01: POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS
KEWAUNEE NUCLEAR POWER PLANT 60-DAY RESPONSE**

Hold up area: Following a LOCA, some flow will be diverted to Reactor Cavity Containment Sump C due to an opening cut in the personnel access hatch 2.5 feet above the 592' containment basement floor elevation. The flooding of Sump C and submergence of the lower reactor vessel head was a recommendation from the Severe Accident Management Guidelines. The flow diversion does not adversely affect the net positive suction head (NPSH) available to the residual heat removal (RHR) pumps. This flow diversion was taken into account when calculating transport velocities and NPSH available for the RHR pumps post-LOCA.

In summary, the containment floor plans have been previously evaluated and have been determined not to create obstructions that would prevent the transport of water required for containment recirculation.

- ***Ensuring sump screens are free of adverse gaps and breaches***

Interim compensatory measures that will be implemented

NMC visually inspected the containment recirculation sump screens on April 30, 2003, and they were observed to be in good condition. A general comparison was made with the design drawing for the screens and no obvious defects, gaps, breaches, corrosion or damage was noted. While not specifically defined, the screens were observed for adverse alignment including gaps and breaches. Similarly the screens are visually inspected each refueling outage by procedural requirement which would identify any damage that may have occurred to the screens. Therefore, no additional compensatory action is necessary.

NMC has addressed above, the six compensatory measures as discussed in the Bulletin. Therefore, there are no compensatory measures, as listed in the Discussion section of the Bulletin, that have not been addressed.

In addition, NMC is committing to perform an evaluation to analyze the emergency core cooling system and containment spray system recirculation functions with respect to the potentially adverse post-accident debris blockage effects on the containment sump, taking into account the recent research findings, to determine compliance with applicable regulatory requirements. NMC will continue to work with the Nuclear Energy Institute (NEI) to follow Generic Safety Issue 191 resolution methodology, currently being developed by NEI. NMC will implement the methodology, as appropriate for Kewaunee Nuclear Power Plant. The commitments made in relation to the compensatory measures will remain in effect until an evaluation to determine compliance is complete.